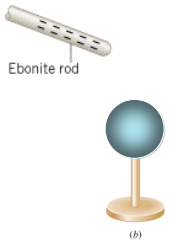
Charging by Contact and Induction

There are three methods used to create static charges:

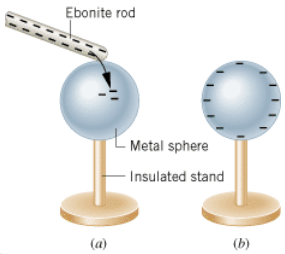
1. Charging by Friction ✓
2. Charging by Contact
3. Charging by Induction

Charging by Contact

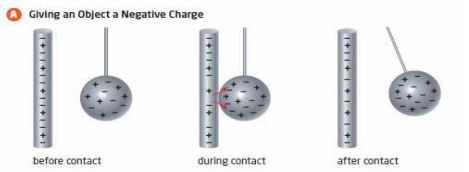
- When charging by contact, the two objects being used have **different charges before we begin**.
- In most cases one object is charged and the other is neutral.



- When the objects are brought into contact, **some** of the electrons from the negatively charged object will transfer to the neutral object.

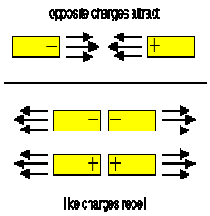


- When the two objects are separated, they will both have a negative charge.
- **Both** of the objects **have some of the negative charges.**
- The objects now **repel** one another.



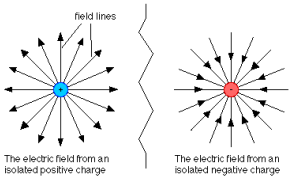
Law of Electrical Charges

- Unlike charges attract one another
- Like charges repel one another
- Charged and neutral objects attract



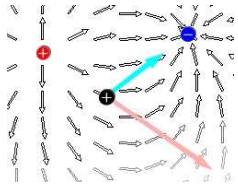
Detecting Electric Charges

- An object that has an electric charge can exert an **electric force**, which creates an **electric field** around that object
- The electric force can be an attraction, or a repulsion.



• Scientists use the idea of the electric force to determine if an object has a charge, and what charge the object has.

- Eg. If the object is **positive,** other positive objects are repelled
- If the object is **neutral,** both positive and negative charges are attracted.

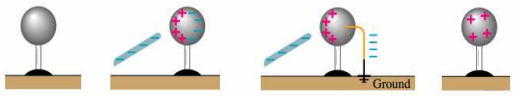


- The stronger the charge of an object, the stronger the electric field.
- Now try the hockey game again!!

http://phet.colorado.edu/en/simulation/electric-hockey

Charging by Induction

- When a charge is created by bringing two objects close to one another without actually touching. **There is no contact!!**
- Electrons move because of the electric field of the nearby charged object.



Neutral

Negative rod is brought near the neutral sphere. This causes an induced charge separation.

A ground is attached to the sphere; this allows the electrons to move off of the sphere.

The ground is removed from the sphere first then the rod is removed. The sphere is now positively charged.

Induced charge separation can also cause a neutral pith ball to move **toward** a negatively charged rod, again due to the electric field of the nearby rod.

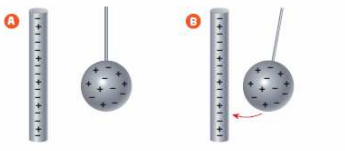
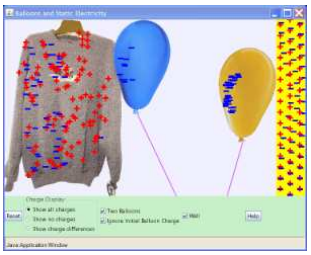


Figure 10.14 A The rod is negatively charged, and the pith ball is neutral. B The induced charge separation on the pith ball causes it to swing toward the rod.

Back to the balloon example…



- Negative charges (electrons) are transferred from the sweater to the balloon.
- If you bring the balloon next to the wall the electric force of the balloon causes an **induced charge separation** – the electrons in the wall move away – the balloon moves to the wall!

Do Electroscope Lab

Homework
Prepare for lab.

- Read p. 411 – 417
- P. 417 #1, 3, 5 – 7